

REMARKS/ARGUMENTS

Claims 1-4 and 11-45 have been resubmitted. Claims 1, 2, 4, 11, 13, 14, 18-21, 23, 26, 32, and 33 have been amended. Claims 12, 15-17, and 36-40 have been canceled. New Claims 46-51 have been added.

The Examiner rejected Claims 23, 26-28, 32, and 33 under 35 U.S.C. Section 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner also rejected Claim 1 under 35 U.S.C. Section 102(b) as being anticipated by Matsudaira (US 4,670,355). Under 35 U.S.C. Section 102(e), the Examiner rejected Claims 1, 4, 11, and 12 as being anticipated by Skoog et al. (US 6, 210,791). The Examiner also rejected Claims 15-17, 19, 20, and 36-40 under 35 U.S.C. Section 103(a) as being unpatentable over Skoog et al. (US 6, 210,791) in view of Li et al. (US 6, 582,779).

The Examiner objected to Claims 2, 3, 13, 14, 18, and 21 as being dependent upon a rejected base claim. The Examiner further stated that Claims 2, 3, 13, 14, 18, and 21 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Additionally, the Examiner stated that Claims 23, 26-28, 32, and 33 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. Section 112, second paragraph, set forth in the Office Action, and to include all of the limitations of the base claim and any intervening claims. The Examiner allowed Claims 22, 24, 25, 29, 30, 31, 34, 35, and 41-45, for which Applicant thanks the Examiner.

35 U.S.C. § 112, second paragraph

Applicant has amended Claims 23, 26, and 33 to address issues mentioned by the Examiner. The Examiner rejected Claim 32. However, Applicant respectfully notes that no explanation was provided for the rejection of Claim 32. Assuming, *arguendo*, that the Examiner's rejection of Claim 32 is similar to the Examiner's rejection of Claims 23, 26, and 33, Applicant has amended Claim 32 accordingly.

The Examiner listed Claim 34 along with Claims 23 and 33 although the Examiner allowed Claim 34. Perhaps the Examiner intended to list Claim 32, instead of Claim 34.

Matsudaira (US 4,670,355)

The Matsudaira reference discloses an electroluminescent display panel with a transparent glass substrate and a layer including Ta_2O_5 and Al_2O_3 . (col. 2, lines 21-26, 51-54). The dielectric layer should be in intimate contact with an adjacent layer. (col. 1, lines 36-38).

Claim 1, as amended, comprises a protective coating "wherein the protective coating is substantially crystalline" at line 7. The Matsudaira disclosure does not teach a protective coating wherein the protective coating is crystalline. Instead, Matsudaira teaches away from Claim 1, as amended. At col. 3, lines 45-47 the first layer is disclosed as amorphous ("At any rate, it has been found that the first dielectric layer 16 is an amorphous film of the mixture of tantalum oxide $[Ta_xO_y]$ and aluminum oxide (Al_xO_y) ."). At col. 4, lines 60-62, the Matsudaira reference discloses that the second layer is amorphous ("As a result, the second dielectric film 17 is an amorphous film comprising tantalum oxide $[Ta_xO_y]$ and aluminum oxide (Al_xO_y) ."). The Matsudaira reference discloses, at col. 1, lines 54-57, that a crystalline coating is not suitable for a dielectric layer ("The dielectric layer of either lead titanate or barium titanate is

not only liable to be variable in composition but also low in dielectric strength because each of lead titanate and barium titanate is crystalline. As shown in paragraphs [0007] and [0008] and Claim 11, the protective coating, made by the methods disclosed in the present invention, is crystalline to protect the substrate from the environment. Thus, Applicant submits that independent Claim 1, as amended, is not anticipated by the Matsudaira reference.

Skoog, et al. (US 6, 210,791)

The Skoog reference discloses coating a metal or ceramic substrate with a diffuse reflective barrier coating and a low-emissivity top coat covering the diffuse reflective barrier coating. (Abstract, lines 1-5). The coating method disclosed in the Skoog reference requires a smooth surface of the diffuse reflective barrier coating. (col. 3, lines 28-44; col. 6, lines 60-64).

As mentioned in the discussion regarding the Matsudaira reference, above, the Skoog reference does not disclose the substrate having a crystalline protective coating, as in Claim 1, as currently amended. Furthermore, the Skoog reference mentioned 1-40 wt% concentration for other particles including tantalum oxide in the coating (col. 8, lines 58-61). Assuming that the balance is 60 wt% aluminum oxide, for a coating with 40 wt% tantalum oxide, the molar ratio of tantalum oxide to aluminum oxide would be 13.3 mol%: 86.7 mol%. This indicates that tantalum oxide is a minor ingredient of the coating of the Skoog reference, and the coating composition is much different from the composition of the coating of the present invention. Thus, Applicant submits that independent Claim 1, as amended, is not anticipated by the Skoog reference. Regarding Claim 4, Applicant has amended Claim 4 to be dependent upon Claim 2, as amended to be allowable. Thus, Applicant submits that Claim 4 is now patentable over the prior art.

Regarding Claim 11, the Examiner mentioned that the coating disclosed in the Skoog reference may be sintered. Applicant notes respectfully that Claim 11 does not describe sintering. Claim 11 has been amended to specify the La_2O_3 concentration, as supported by the original application at page 7, lines 11-12. Thus, Applicant submits that Claim 11, as amended, is not anticipated by the Skoog reference. Claim 12 has been cancelled. Thus, Applicant submits that the rejection of Claim 12 is now moot.

Li, et al. (US 6, 582,779)

The Li reference discloses a turbomachine component with a silicon nitride substrate with a multi-layer coating bonded to the substrate. The outer surface of the substrate may be roughened. (col. 5, lines 10-11).

Applicant has cancelled Claims 15-17 and 36-40. Additionally, Applicant has amended Claims 19 and 20 from being dependent upon Claim 15 to being dependent upon Claim 18, as amended. Thus, Applicant respectfully submits that the rejection of Claims 15-17, 19, 20, and 36-40 is now moot.

New Claims

New Claim 46 finds support in the originally filed Application at page 6, paragraph [0019], lines 1-3 ("The coating layer 204 may be formed of a mixture of Ta_2O_5 and one or more additives including Al_2O_3 or La_2O_3 . The coating thickness can be accurately controlled by EB-PVD techniques and may vary between 0.5 to 10 mil."), at page 7, paragraph [0021], lines 2-3 ("The ceramic powder became molten and subsequently was quenched and solidified onto the coupons. "), at page 7, paragraph [0022], lines 11-13 ("The ceramic powder became molten and subsequently was quenched and solidified onto the coupons."), at page 8, paragraph [0024], lines 6-7 (" . . . showed that the grain size for the 5 mol% Al_2O_3 coating composition fired at 1450°C was significantly

smaller than the pure Ta_2O_5 sample fired at the same temperature. ") and in the originally submitted Claim 16. Applicant respectfully submits that new Claim 46, dependent upon Claim 18, as amended to be allowable, is now patentable over the prior art.

New Claim 47 finds support in the originally filed Application at page 4, paragraph [0014], lines 2-4 ("As shown by the method 100 in Figure 1, the process may start with a commercially available Ta_2O_5 powder (step 102), to which a desirable amount (about 1 – 50 mol.%) of additives are added (step 105."), at page 6, paragraph [0021], lines 2-4 ("In each batch, about 1 Kg of a commercial beta Ta_2O_5 powder was mixed with commercial Al_2O_3 powder in isopropanol in a milling jar for about 2 hours before drying."), and in the originally submitted Claim 17. Applicant respectfully submits that new Claim 47, dependent upon Claim 18, as amended to be allowable, is now patentable over the prior art.

New Claim 48 finds support in the originally filed Application at page 3, paragraph [0006], lines 1-4 ("According to one aspect of the present invention, a component comprises a silicon-based substrate; and a protective coating for the substrate. The protective coating includes tantalum oxide (Ta_2O_5) and an additive for suppressing transformation from beta Ta_2O_5 to alpha Ta_2O_5 ."), at page 3, paragraph [0007], lines 1-2 ("Figure 1 illustrates a first method of improving the crystalline structure of a coating composition."), at page 3, paragraph [0008], lines 1-2 ("Figure 2 illustrates a second method of improving the crystalline structure of a coating composition.") at page 3, paragraph [0011], lines 2-6 (" . . . It is believed that the Al_2O_3 solid solution in Ta_2O_5 changes the defect structure of Ta_2O_5 such that ionic diffusion rate is slowed and that the transformation of beta to alpha Ta_2O_5 , which triggers exaggerated grain growth at temperatures greater than 1350°C, is suppressed by the presence of Al_2O_3 ."), at page 5, paragraph [0017], lines 1-4 ("The additive is not limited to an oxide of

aluminum. The additive for the coating may include one or more of other oxides, compounds, or their precursors of Al, Hf, Si, Ln (rare earth including whole lanthanum series and Y) Mg, Mo, Ni, Nb, Sr, Ti, and/ or Zr."), and in the originally submitted Claims 1, 2, 11, and 15. The prior art does not disclose, suggest or motivate a silicon-based substrate with a crystalline protective coating comprising tantalum oxide and aluminum oxide wherein CaO is eliminated and wherein the coating further includes an oxide, compound, or precursor chosen from the group consisting of Hf, Si, Ln (rare earth including whole lanthanum series and yttrium) Mg, Mo, Ni, Nb, Sr, and Ti. Accordingly, Applicant respectfully submits that new Claim 48 is patentable over the prior art.

New Claim 49 finds support in the originally submitted Claim 3 while new Claim 50 finds support in the originally submitted Claim 4. New Claims 49 and 50 are dependent upon new Claim 48, which, as explained above, Applicant respectfully submits is patentable. Accordingly, Applicant respectfully submits that new Claims 49 and 50 are patentable over the prior art.

New Claim 51 finds support in the originally filed Application at page 3, paragraph [0007], lines 1-2 ("Figure 1 illustrates a first method of improving the crystalline structure of a coating composition."), at page 3, paragraph [0008], lines 1-2 ("Figure 2 illustrates a second method of improving the crystalline structure of a coating composition.") at page 5, paragraph [0017], lines 7-8 ("Additional additives (e.g., nitrides, carbides, borides, silicides) can be introduced . . .") and in the originally submitted Claims 3 and 11. The prior art does not disclose, suggest or motivate a silicon-based substrate with a crystalline protective coating comprising tantalum oxide and aluminum oxide wherein CaO is eliminated and wherein the coating further includes an additive selected from the group consisting of carbides, borides and silicides. Accordingly, Applicant respectfully submits that new Claim 51 is patentable over the prior art.

Allowable Subject Matter

The Examiner stated that Claims 2, 3, 13, 14, 18, and 21 would be allowable if rewritten in independent form including all limitations of the base claim and any intervening claims. Applicant has amended these claims as suggested by the Examiner. Thus, Applicant respectfully submits that Claims 2, 3, 13, 14, 18, and 21 are patentable, as amended.

The Examiner also stated that Claims 23, 26-28, 32, and 33 would be allowable if rewritten to overcome the rejections under 35 U.S.C. Section 112, second paragraph, set forth in the Office Action and to include all of the limitations of the base claim and any intervening claims. Applicant has rewritten Claims 23, 26, and 33 to overcome the rejections under 35 U.S.C. Section 112, second paragraph, as explained above. Additionally, Applicant has amended Claims 23, 26, and 33 to include all of the limitations of the base claim and any intervening claims, as suggested by the Examiner. Applicant respectfully submits that Claims 27-28, dependent upon Claim 26, as amended, include all of the limitations of the base claim, Claim 26, and thus are patentable over the prior art. As explained above, Applicant respectfully notes that no explanation was provided for the rejection of Claim 32. Nevertheless, Applicant has amended Claim 32 and respectfully submits that Claims 23, 26-28, 32, and 33 are now patentable over the prior art.

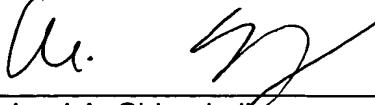
CONCLUSION

Reconsideration and withdrawal of the Office Action with respect to Claims 1-4, 11, 13, 14, 18, 18-35, and 41-45 is requested.

In the event the examiner wishes to discuss any aspect of this response,
please contact the attorney at the telephone number identified below.

Respectfully submitted,

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